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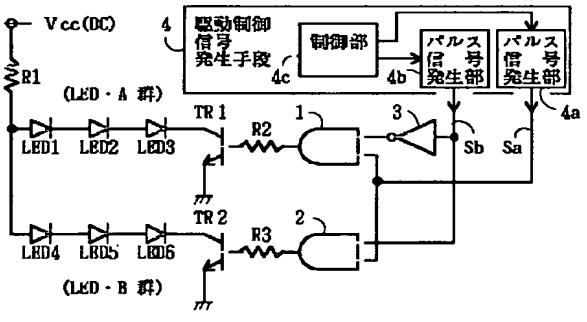
(54)【発明の名称】　発光素子駆動制御装置

(57)【要約】
【課題】　バックライト等のような複数のＬＥＤをパルス駆動する発光素子駆動制御装置ににおいて、スイッチングノイズの低減等を図る。
【解決手段】　第１のパルス信号発生部4aが発生する第１のパルス信号Saと第２のパルス信号発生部4bが発生する第２のパルス信号Sbとを、第１の論理積ゲート１、第２の論理積ゲート２及びインバータ３とからなる駆動部へ入力する。また、第２のパルス信号Sbの周期は第１のパルス信号Saの２倍にする。これにより第１の論理積ゲート１及び第２の論理積ゲート２からは位相のズレたパルス信号が出力され、それぞれスイッチング用のトランジスタTR１、TR２が交互にオンオフすることとなってスイッチングノイズの発生を分散する。



【特許請求の範囲】

【請求項１】　スイッチング用の第１のトランジスタのコレクタに複数のＬＥＤ（発光ダイオード）が直列に接続され、同直列接続した複数のＬＥＤの他端より抵抗を介して直流電源が印加される第１のＬＥＤ回路と、スイッチング用の第２のトランジスタのコレクタに複数のＬＥＤを直列に接続し、同直列接続した複数のＬＥＤの他端より前記抵抗を介して直流電源が印加される第２のＬＥＤ回路と、前記第１のトランジスタ又は第２のトランジスタのオンオフ制御に供する信号であって、予め設定したパルス幅の第１のパルス信号と、同第１のパルス信号の２倍の周期の予め設定したパルス幅の第２のパルス信号とを駆動制御信号として発生する駆動制御信号発生手段と、前記駆動制御信号発生手段よりの駆動制御信号をもとに、前記第１のトランジスタと第２のトランジスタとを交互にオン又はオフする駆動信号を同第１のトランジスタのベース又は第２のトランジスタのベースへ出力する駆動部とで構成し、前記第１のＬＥＤ回路のＬＥＤと第２のＬＥＤ回路のＬＥＤとを交互に点灯又は消灯することを特徴とする発光素子駆動制御装置。

【請求項２】　前記駆動制御信号発生手段を、前記第１のパルス信号を発生する第１のパルス信号発生部と、前記第２のパルス信号を発生する第２のパルス信号発生部と、前記第１のパルス信号発生部及び第２のパルス信号発生部とを制御する制御部とで構成したことを特徴とする請求項１記載の発光素子駆動制御装置。

【請求項３】　前記第１のＬＥＤ回路には第１の抵抗を介して直流電源を印加し、前記第２のＬＥＤ回路には第２の抵抗を介して直流電源を印加するとともに、前記駆動制御信号発生手段の制御部の下にＡ／Ｄ変換部及び判定部とを設ける一方、前記第１の抵抗と第１のＬＥＤ回路との接続点及び前記第２の抵抗と第２のＬＥＤ回路との接続点それぞれの電圧を故障検出用電圧として前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記故障検出用電圧それぞれをディジタルデータに変換し、同変換したそれぞれのデータを前記判定部で基準値と比較判別し、何れか一方のＬＥＤ回路の前記故障検出用電圧が基準値を超えたことを判別したときには、前記第１のパルス信号のパルス幅を拡げ、他方のＬＥＤ回路の点灯期間を長くすることを特徴とする請求項１又は請求項２記載の発光素子駆動制御装置。

【請求項４】　前記駆動部を、前記第２のパルス信号を反転するインバータと、同インバータよりの信号と前記第１のパルス信号との論理積をとった信号を前記第１のトランジスタのベースへ送出する第１の論理積ゲートと、前記第１のパルス信号と第２のパルス信号との論理積をとった信号を前記第２のトランジスタのベースへ送出する第２の論理積ゲートとで構成したことを特徴とする請求項１又は請求項３記載の発光素子駆動制御装置。

【請求項５】　前記第２のパルス信号のパルス幅を、１周期の２分の１に設定したことを特徴とする請求項１又は請求項３記載の発光素子駆動制御装置。

【請求項６】　スイッチング用のトランジスタのコレクタに複数のＬＥＤが直列に接続され、同直列接続した複数のＬＥＤの他端より抵抗を介して直流電源が印加されるＬＥＤ回路と、上限値を可変した鋸波状の駆動制御信号を発生する駆動制御信号発生手段と、前記駆動制御信号発生手段よりの駆動制御信号をもとに、前記トランジスタをオン又はオフする駆動信号を同トランジスタのベースへ出力する駆動部とで構成し、前記鋸波状の駆動制御信号の上限値を可変することにより前記複数のＬＥＤの発光の明るさを制御することを特徴とする発光素子駆動制御装置。

【請求項７】　前記駆動制御信号発生手段を、前記鋸波状の駆動制御信号を発生する鋸波発生部と、前記鋸波発生部を制御する制御部とで構成したことを特徴とする請求項６記載の発光素子駆動制御装置。

【請求項８】　Ａ／Ｄ変換部及び比較部とを前記駆動制御信号発生手段の制御部の下に設ける一方、前記複数のＬＥＤ用の直流電源を抵抗分割する抵抗分割回路を設け、同抵抗分割回路による分圧電圧を前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記分圧電圧をディジタルデータに変換し、同変換したデータを前記比較部で基準値と比較し、同比較における変動に応じて前記鋸波状の駆動制御信号の上限値を可変し、前記複数のＬＥＤの発光の明るさを一定にするように制御することを特徴とする請求項６又は請求項７記載の発光素子駆動制御装置。

【請求項９】　Ａ／Ｄ変換部及び比較部とを前記駆動制御信号発生手段の制御部の下に設ける一方、周囲光の明るさを検出する光センサを設け、同光センサよりの検出信号を前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記検出信号をディジタルデータに変換し、同変換したデータを前記比較部で基準値と比較し、同比較における変動に応じて前記鋸波状の駆動制御信号の上限値を可変し、前記周囲光の明るさに応じて前記複数のＬＥＤの発光の明るさを制御することを特徴とする請求項６又は請求項７記載の発光素子駆動制御装置。

【請求項１０】　前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の駆動制御信号が正相入力端に入力し、逆相入力端には前記複数のＬＥＤ用の直流電源をもとに安定化した予め設定の直流電圧を印加し、前記駆動制御信号が前記直流電圧を超えた期間をパルス幅としたパルス信号を前記トランジスタのベースへ送出する演算増幅器で構成したことを特徴とする請求項６、請求項８又は請求項９記載の発光素子駆動制御装置。

【請求項１１】　前記逆相入力端に印加する直流電圧を、前記複数のＬＥＤ用の直流電源に抵抗を介して接続

されたツエナーダイオードの両端電圧としたことを特徴とする請求項１０記載の発光素子駆動制御装置。

【請求項１２】　前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の駆動制御信号が正相入力端に入力し、逆相入力端には前記複数のＬＥＤ用の直流電源を抵抗分割した予め設定の直流電圧を印加し、前記駆動制御信号が前記直流電圧を超えた期間をパルス幅としたパルス信号を前記トランジスタのベースへ送出する演算増幅器で構成したことを特徴とする請求項６記載の発光素子駆動制御装置。

【請求項１３】　前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の駆動制御信号が正相入力端に入力し、逆相入力端には、周囲光の明るさを検出する光センサよりの検出信号が入力し、前記駆動制御信号が前記検出信号に係る直流電圧を超えた期間をパルス幅としたパルス信号を前記トランジスタのベースへ送出する演算増幅器で構成し、前記検出信号に応じて前記複数のＬＥＤの発光の明るさを制御することを特徴とする請求項６記載の発光素子駆動制御装置。

【請求項１４】　スイッチング用の第１のトランジスタのコレクタに複数のＬＥＤが直列に接続され、同直列接続した複数のＬＥＤの他端より抵抗を介して直流電源が印加される第１のＬＥＤ回路と、スイッチング用の第２のトランジスタのコレクタに複数のＬＥＤを直列に接続し、同直列接続した複数のＬＥＤの他端より前記抵抗を介して直流電源が印加される第２のＬＥＤ回路と、前記第１のトランジスタ又は第２のトランジスタのオンオフ制御に供する信号であって、鋸波状の第１の信号と、同鋸波状の信号と同一周期の予め設定したパルス幅からなるパルス信号である第２の信号とを駆動制御信号として発生する駆動制御信号発生手段と、前記駆動制御信号発生手段よりの駆動制御信号をもとに、前記第１のトランジスタと第２のトランジスタとを交互にオン又はオフする駆動信号を同第１のトランジスタのベース又は第２のトランジスタのベースへ出力する駆動部とで構成し、前記第１のＬＥＤ回路のＬＥＤと第２のＬＥＤ回路のＬＥＤとを交互に点灯又は消灯することを特徴とする発光素子駆動制御装置。

【請求項１５】　前記駆動制御信号発生手段を、前記第１の信号を発生する鋸波発生部と、前記第２の信号を発生するパルス信号発生部と、前記鋸波発生部及びパルス信号発生部とを制御する制御部とで構成したことを特徴とする請求項１４記載の発光素子駆動制御装置。

【請求項１６】　前記第１のＬＥＤ回路には第１の抵抗を介して直流電源を印加し、前記第２のＬＥＤ回路には第２の抵抗を介して直流電源を印加するとともに、前記駆動制御信号発生手段の制御部の下にＡ／Ｄ変換部及び判定部とを設ける一方、前記第１の抵抗と第１のＬＥＤ回路との接続点及び前記第２の抵抗と第２のＬＥＤ回路との接続点それぞれの電圧を故障検出用電圧として前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記故障検出用電圧それぞれをディジタルデータに変換し、同変換したそれぞれのデータを前記判定部で基準値と比較判別し、何れか一方のＬＥＤ回路の前記故障検出用電圧が基準値を超えたことを判別したときには、前記鋸波状の第１の信号の上限値を高くし、他方のＬＥＤ回路の点灯期間を長くすることを特徴とする請求項１４又は請求項１５記載の発光素子駆動制御装置。

【請求項１７】　前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の第１の信号が正相入力端に入力し、逆相入力端には前記複数のＬＥＤ用の直流電源をもとに安定化した予め設定の直流電圧を印加し、前記駆動制御信号が前記直流電圧を超えた期間をパルス幅としたパルス信号を出力する演算増幅器と、前記第２の信号を反転するインバータと、同インバータよりの信号と前記演算増幅器よりの信号との論理積をとった信号を前記第１のトランジスタのベースへ送出する第１の論理積ゲートと、前記演算増幅器よりの信号と第２の信号との論理積をとった信号を前記第２のトランジスタのベースへ送出する第２の論理積ゲートとで構成したことを特徴とする請求項１４又は請求項１６記載の発光素子駆動制御装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は発光素子駆動制御装置に係り、より詳細には、液晶表示素子（ＬＣＤ）のバックライト等に使用されるＬＥＤ（発光ダイオード）の駆動制御に関する。

【０００２】

【従来の技術】図１０は複数のＬＥＤからなる従来の発光素子駆動制御装置の一例である。図示のように、本例では３個としたＬＥＤ（ＬＥＤ21、同22、同23）とスイッチング用のトランジスタTR21及び抵抗Ｒ22とからなる一つのＬＥＤ回路と、同じく３個のＬＥＤ（ＬＥＤ24、同25、同26）とスイッチング用のトランジスタTR22及び抵抗Ｒ23とからなる他のＬＥＤ回路とが並列に接続され、これら並列接続のＬＥＤ回路一端側より抵抗Ｒ21を介し所定電圧の直流電源Ｖcc（DC）から電源供給を受ける。また、並列接続のＬＥＤ回路の他端側には、主にマイクロコンピュータで構成される駆動制御信号発生手段21からのパルス状の駆動制御信号Ｓ11が入力し、抵抗Ｒ22又は抵抗Ｒ23を介しトランジスタTR21又はトランジスタTR22それぞれのベースへ加えら、これらTR21又はTR22をオンオフしている。

【０００３】

【発明が解決しようとする課題】しかしながら、前記従来の発光素子駆動制御装置においては、複数のＬＥＤ（ＬＥＤ21～ＬＥＤ26）を一斉にオンオフさせるために、トランジスタTR21及びTR22のスイッチングノイズの

発生が集中するという欠点があった。また、従来の構成のもとでは、直流電源Vccが電圧変動した場合にはその影響を直接受け、ＬＥＤ発光の明るさが変動するという欠点、又は一部のＬＥＤが故障して点灯しなくなった場合にはそれと直列に接続されているＬＥＤも点灯しなくなり、全体の明るさが低下するという欠点、更には周囲の明るさが変化してもＬＥＤ発光の明るさは一定であり、周囲の明るさに応じた明るさにすることが出来ないという欠点、があった。本発明は上記欠点の改善を図った発光素子駆動制御装置を提供することを目的としたものである。

【０００４】

【課題を解決するための手段】本発明は、スイッチング用の第１のトランジスタのコレクタに複数のＬＥＤ（発光ダイオード）が直列に接続され、同直列接続した複数のＬＥＤの他端より抵抗を介して直流電源が印加される第１のＬＥＤ回路と、スイッチング用の第２のトランジスタのコレクタに複数のＬＥＤを直列に接続し、同直列接続した複数のＬＥＤの他端より前記抵抗を介して直流電源が印加される第２のＬＥＤ回路と、前記第１のトランジスタ又は第２のトランジスタのオンオフ制御に供する信号であって、予め設定したパルス幅の第１のパルス信号と、同第１のパルス信号の２倍の周期の予め設定したパルス幅の第２のパルス信号とを駆動制御信号として発生する駆動制御信号発生手段と、前記駆動制御信号発生手段よりの駆動制御信号をもとに、前記第１のトランジスタと第２のトランジスタとを交互にオン又はオフする駆動信号を同第１のトランジスタのベース又は第２のトランジスタのベースへ出力する駆動部とで構成し、前記第１のＬＥＤ回路のＬＥＤと第２のＬＥＤ回路のＬＥＤとを交互に点灯又は消灯する発光素子駆動制御装置を提供するものである。

【０００５】また、前記駆動制御信号発生手段を、前記第１のパルス信号を発生する第１のパルス信号発生部と、前記第２のパルス信号を発生する第２のパルス信号発生部と、前記第１のパルス信号発生部及び第２のパルス信号発生部とを制御する制御部とで構成する。

【０００６】また、前記第１のＬＥＤ回路には第１の抵抗を介して直流電源を印加し、前記第２のＬＥＤ回路には第２の抵抗を介して直流電源を印加するとともに、前記駆動制御信号発生手段の制御部の下にＡ／Ｄ変換部及び判定部とを設ける一方、前記第１の抵抗と第１のＬＥＤ回路との接続点及び前記第２の抵抗と第２のＬＥＤ回路との接続点それぞれの電圧を故障検出用電圧として前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記故障検出用電圧それぞれをディジタルデータに変換し、同変換したそれぞれのデータを前記判定部で基準値と比較判別し、何れか一方のＬＥＤ回路の前記故障検出用電圧が基準値を超えたことを判別したときには、前記第１のパルス信号のパルス幅を拡げ、他方のＬＥＤ回路の点灯期間を長くする。

【０００７】また、前記駆動部を、前記第２のパルス信号を反転するインバータと、同インバータよりの信号と前記第１のパルス信号との論理積をとった信号を前記第１のトランジスタのベースへ送出する第１の論理積ゲートと、前記第１のパルス信号と第２のパルス信号との論理積をとった信号を前記第２のトランジスタのベースへ送出する第２の論理積ゲートとで構成する。

【０００８】また、前記第２のパルス信号のパルス幅を、１周期の２分の１に設定する。

【０００９】また、本発明は、スイッチング用のトランジスタのコレクタに複数のＬＥＤが直列に接続され、同直列接続した複数のＬＥＤの他端より抵抗を介して直流電源が印加されるＬＥＤ回路と、上限値を可変した鋸波状の駆動制御信号を発生する駆動制御信号発生手段と、前記駆動制御信号発生手段よりの駆動制御信号をもとに、前記トランジスタをオン又はオフする駆動信号を同トランジスタのベースへ出力する駆動部とで構成し、前記鋸波状の駆動制御信号の上限値を可変することにより前記複数のＬＥＤの発光の明るさを制御する発光素子駆動制御装置を提供するものである。

【００１０】また、前記駆動制御信号発生手段を、前記鋸波状の駆動制御信号を発生する鋸波発生部と、前記鋸波発生部を制御する制御部とで構成する。

【００１１】また、Ａ／Ｄ変換部及び比較部とを前記駆動制御信号発生手段の制御部の下に設ける一方、前記複数のＬＥＤ用の直流電源を抵抗分割する抵抗分割回路を設け、同抵抗分割回路による分圧電圧を前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記分圧電圧をディジタルデータに変換し、同変換したデータを前記比較部で基準値と比較し、同比較における変動に応じて前記鋸波状の駆動制御信号の上限値を可変し、前記複数のＬＥＤの発光の明るさを一定にするように制御する。

【００１２】また、Ａ／Ｄ変換部及び比較部とを前記駆動制御信号発生手段の制御部の下に設ける一方、周囲光の明るさを検出する光センサを設け、同光センサよりの検出信号を前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記検出信号をディジタルデータに変換し、同変換したデータを前記比較部で基準値と比較し、同比較における変動に応じて前記鋸波状の駆動制御信号の上限値を可変し、前記周囲光の明るさに応じて前記複数のＬＥＤの発光の明るさを制御する。

【００１３】また、前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の駆動制御信号が正相入力端に入力し、逆相入力端には前記複数のＬＥＤ用の直流電源をもとに安定化した予め設定の直流電圧を印加し、前記駆動制御信号が前記直流電圧を超えた期間をパルス幅とした

パルス信号を前記トランジスタのベースへ送出する演算増幅器で構成する。

【００１４】また、前記逆相入力端に印加する直流電圧を、前記複数のＬＥＤ用の直流電源に抵抗を介して接続されたツエナーダイオードの両端電圧とする。

【００１５】または、前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の駆動制御信号が正相入力端に入力し、逆相入力端には前記複数のＬＥＤ用の直流電源を抵抗分割した予め設定の直流電圧を印加し、前記駆動制御信号が前記直流電圧を超えた期間をパルス幅としたパルス信号を前記トランジスタのベースへ送出する演算増幅器で構成する。

【００１６】また、前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の駆動制御信号が正相入力端に入力し、逆相入力端には、周囲光の明るさを検出する光センサよりの検出信号が入力し、前記駆動制御信号が前記検出信号に係る直流電圧を超えた期間をパルス幅としたパルス信号を前記トランジスタのベースへ送出する演算増幅器で構成し、前記検出信号に応じて前記複数のＬＥＤの発光の明るさを制御する。

【００１７】また、本発明は、スイッチング用の第１のトランジスタのコレクタに複数のＬＥＤが直列に接続され、同直列接続した複数のＬＥＤの他端より抵抗を介して直流電源が印加される第１のＬＥＤ回路と、スイッチング用の第２のトランジスタのコレクタに複数のＬＥＤを直列に接続し、同直列接続した複数のＬＥＤの他端より前記抵抗を介して直流電源が印加される第２のＬＥＤ回路と、前記第１のトランジスタ又は第２のトランジスタのオンオフ制御に供する信号であって、鋸波状の第１の信号と、同鋸波状の信号と同一周期の予め設定したパルス幅からなるパルス信号である第２の信号とを駆動制御信号として発生する駆動制御信号発生手段と、前記駆動制御信号発生手段よりの駆動制御信号をもとに、前記第１のトランジスタと第２のトランジスタとを交互にオン又はオフする駆動信号を同第１のトランジスタのベース又は第２のトランジスタのベースへ出力する駆動部とで構成し、前記第１のＬＥＤ回路のＬＥＤと第２のＬＥＤ回路のＬＥＤとを交互に点灯又は消灯する発光素子駆動制御装置を提供するものである。

【００１８】また、前記駆動制御信号発生手段を、前記第１の信号を発生する鋸波発生部と、前記第２の信号を発生するパルス信号発生部と、前記鋸波発生部及びパルス信号発生部とを制御する制御部とで構成する。

【００１９】また、前記第１のＬＥＤ回路には第１の抵抗を介して直流電源を印加し、前記第２のＬＥＤ回路には第２の抵抗を介して直流電源を印加するとともに、前記駆動制御信号発生手段の制御部の下にＡ／Ｄ変換部及び判定部とを設ける一方、前記第１の抵抗と第１のＬＥＤ回路との接続点及び前記第２の抵抗と第２のＬＥＤ回路との接続点それぞれの電圧を故障検出用電圧として前記駆動制御信号発生手段に入力し、同駆動制御信号発生手段においては、前記Ａ／Ｄ変換部で前記故障検出用電圧それぞれをディジタルデータに変換し、同変換したそれぞれのデータを前記判定部で基準値と比較判別し、何れか一方のＬＥＤ回路の前記故障検出用電圧が基準値を超えたことを判別したときには、前記鋸波状の第１の信号の上限値を高くし、他方のＬＥＤ回路の点灯期間を長くする。

【００２０】また、前記駆動部を、前記駆動制御信号発生手段よりの鋸波状の第１の信号が正相入力端に入力し、逆相入力端には前記複数のＬＥＤ用の直流電源をもとに安定化した予め設定の直流電圧を印加し、前記駆動制御信号が前記直流電圧を超えた期間をパルス幅としたパルス信号を出力する演算増幅器と、前記第２の信号を反転するインバータと、同インバータよりの信号と前記演算増幅器よりの信号との論理積をとった信号を前記第１のトランジスタのベースへ送出する第１の論理積ゲートと、前記演算増幅器よりの信号と第２の信号との論理積をとった信号を前記第２のトランジスタのベースへ送出する第２の論理積ゲートとで構成する。

【００２１】

【発明の実施の形態】以下、発明の実施の形態を実施例にもとづき図面を参照して説明する。図１は本発明による発光素子駆動制御装置の第１の実施例であってスイッチングノイズの低減を目的とした構成の要部ブロック図、図２は図１を説明するためのタイムチャートである。また、図３は本発明による発光素子駆動制御装置の第２の実施例であってＬＥＤ発光の明るさ（以下、照度と記す）の制御の基本構成を示す要部ブロック図、図４は図３を説明するためのタイムチャートである。また、図５は本発明による発光素子駆動制御装置の第３の実施例であって直流電源Ｖccの電圧変動に対する照度制御の基本構成を示す要部ブロック図である。

【００２２】また、図６は本発明による発光素子駆動制御装置の第４の実施例であって周囲光の変動に対する照度制御の基本構成を示す要部ブロック図である。また、図７は本発明による発光素子駆動制御装置の第５の実施例であって図６の別法であり、周囲光の変動に対する照度制御の基本構成を示す要部ブロック図である。また、図８は本発明による発光素子駆動制御装置の第６の実施例であって前記図１の構成を基本とし、一部ＬＥＤの故障に対処する構成の要部ブロック図である。また、図９は本発明による発光素子駆動制御装置の第７の実施例であって前記図８の構成に図３の構成を取り込んだものであり、スイッチングノイズの低減又は一部ＬＥＤの故障に対処する構成の要部ブロック図である。

【００２３】以下、本発明の各動作について説明する。最初に、スイッチングノイズ低減のための基本構成と動作につき説明する。図１において、直流電源Ｖcc、抵抗R1～R3、発光ダイオードＬＥＤ１～ＬＥＤ６及びスイッ

チング用トランジスタTR1、TR2については従来（図10）と同様のものである。この回路に対し、図示のように第1の論理積ゲート1（以下、ANDゲート1）、第2の論理積ゲート2（以下、ANDゲート2）及びインバータ3とで構成される駆動部を設け、ANDゲート1及びANDゲート2それぞれの入力一端に駆動制御信号発生手段4が発生する駆動制御信号である第1のパルス信号Sa及び第2のパルス信号Sbを印加する。この駆動制御信号発生手段4は主にマイクロコンピュータ（以下、マイコン）で形成され、図示のように前記第1のパルス信号Saを発生する第1のパルス信号発生部4a、前記第2のパルス信号Sbを発生する第2のパルス信号発生部4b及びこれら発生部を制御する制御部4cとを備える。

【0024】上記第1のパルス信号Sa及び第2のパルス信号Sbの波形を図2に示す。図示のように、第2のパルス信号Sbの周期Tbは第1のパルス信号Saの周期Taの2倍とし、また、第2のパルス信号Sbのパルス幅についてはその1周期Tbの2分の1に設定している。これにより、ANDゲート1には第1のパルス信号Sa及び第2のパルス信号Sbをインバータ3で反転した制御信号とが印加され、ANDゲート2には第1のパルス信号Sa及び第2のパルス信号Sbとが印加される。この結果、トランジスタTR1及びTR2のベースには図2に示す波形のパルス信号が印加され、それぞれパルス正期間でオンする。図示ように、TR1又はTR2のベースに加わるパルス信号はオンタイミングがずれている。これにより、LED・A群（LED1～LED3）又はLED・B群（LED4～LED6）は交互にオン（点灯）又はオフ（消灯）し、従来のように全てのLEDが同時にオンオフすることがないのでTR1及びTR2のスイッチングノイズの発生が分散され、同ノイズによる影響を低減できる。

【0025】次に、LED発光の明るさ（照度）の制御につき説明する。図3に照度制御の基本構成を示す。図3は、LEDを3個としたLED回路例であり、スイッチング用トランジスタTRaのコレクタには抵抗Ra、LEDa、LEDb及びLEDcが直列に設けられ、抵抗Raには直流電源Vccが印加される。また、前記TRaを駆動する駆動部としての演算増幅器5を図示のように設け、その正相入力端（＋端）には駆動制御信号発生手段6よりの駆動制御信号Scが入力し、逆相入力端（－端）には直流電源Vccを抵抗Rc及びツェナーダイオードDaとで分圧した所定電圧Vaが印加される。その出力信号は抵抗Rbを介しTRaのベースへ印加される。なお、逆相入力端の前記電圧Vaの安定化が不要の場合には前記ツェナーダイオードDaに代えて抵抗（抵抗分割～図示せず）としてもよい。また、駆動制御信号発生手段6は主にマイコンで形成され、図示のように鋸波状の駆動制御信号Scを発生する鋸波発生部6aと、同鋸波発生部6aを制御する制御部6bとを備える。

【0026】図4には、上記駆動制御信号Sc、逆相入力端（－端）の分圧直流電圧Va及びTRaのベース電圧の各波形を示す。同図に示すように、鋸波発生部6aが出力する駆動制御信号Scは周期Taを一定にした鋸波であり、下限値は固定として上限値が図示のイ、ロ、ハのように可変する信号である。また、上記駆動制御信号Scと分圧直流電圧Vaとの関係は図示のようにする。この結果、演算増幅器5は、駆動制御信号Scが分圧直流電圧Vaを超えた期間についてパルス出力（飽和出力）する。従って、前記上限値がイ、ロ、ハのように変化すればこのパルス出力のパルス幅は異なったものとなる。このパルス幅可変の信号がTRaのベース電圧として印加され、同パルス幅の期間においてLEDa～LEDcがオンする。この場合、パルス幅を広くすればTRaのオン期間が長くなって照度が上がり、逆にパルス幅を狭くすればTRaのオン期間が短くなって照度が下がる。このように、駆動制御信号Scの上限値を可変することにより照度を制御する。

【0027】次に、前記照度制御の構成（図3）を利用した直流電源Vccの変動に対する照度制御につき図5をもとに説明する。図5は前記図3の構成のものに、直流電源Vccを分圧する抵抗Rd及びReを設け、同分圧電圧を電源電圧変動データとして駆動制御信号発生手段7へ入力させたものである。なお、図3と同一のものには同一符号を付してある。上記駆動制御信号発生手段7は主にマイコンで形成され、A／D変換部7a、比較部7b，前記図3と同機能の鋸波状の駆動制御信号Scを発生する鋸波発生部7c及びこれら各機能ブロックを制御する制御部7dとを備える。この駆動制御信号発生手段7においては、A／D変換部7aで入力された前記電源電圧変動データをディジタルデータに変換し、比較部7bにおいてこのディジタルデータと予め設定してある基準値とを比較し、同比較に応じた上限値（図4）に設定した駆動制御信号Scを鋸波発生部7cで発生し、演算増幅器5の正相入力端（＋端）へ出力する。この場合、直流電源Vccが低下し、従って分圧電圧も低下したときには前記上限値を標準値より所要値高くした駆動制御信号Scを出力し、逆に、直流電源Vccが上昇し、従って分圧電圧も上昇したときには前記上限値を標準値より所要値低くした駆動制御信号Scを出力するようにする。これにより、直流電源Vccが変動した分TRaのオン期間が調整され、LEDの照度が安定化される。

【0028】次に、前記照度制御の構成（図3）を利用し、周囲光に追従させた照度制御につき図6をもとに説明する。図6は前記図3の構成のものに、周囲光を検出する光センサ8を設け、同光センサ8の電圧出力を周囲光データとして駆動制御信号発生手段9へ入力させたものである。なお、図3と同一のものには同一符号を付してある。上記駆動制御信号発生手段9は主にマイコンで形成され、A／D変換部9a、比較部9b，前記図3と同機能の鋸波状の駆動制御信号Scを発生する鋸波発生部9c及びこれら各機能ブロックを制御する制御部9dとを備え

る。この駆動制御信号発生手段９においては、Ａ／Ｄ変換部9aで入力された前記周囲光データをディジタルデータに変換し、比較部9bにおいてこのディジタルデータと予め設定してある基準値とを比較し、同比較に応じた上限値に設定した駆動制御信号Scを鋸波発生部9cで発生し、演算増幅器５の正相入力端（＋端）へ出力する。この場合、周囲光が低下（暗く）し、光センサ８の電圧出力が低下したときには前記上限値を標準値より所要値高くした駆動制御信号Scを出力し、逆に、周囲光が上昇（明るく）し、光センサ８の電圧出力が上昇したときには前記上限値を標準値より所要値低くした駆動制御信号Scを出力するようにする。これにより、周囲光が変動した分TRａのオン期間が調整され、ＬＥＤの照度が安定化される。

【００２９】または前記図６の構成の別法として、図７の構成としてもよい。図７は前記図３の構成における演算増幅器５の逆相入力端（－端）に光センサ８の電圧出力を入力したものである。なお、図３又は図６と同一のものには同一符号を付してある。この構成により、逆相入力端（－端）の電位が周囲光に応じて変動し、周囲光が低下（暗く）すると同電位も低下し、周囲光が上昇（明るく）すると同電位も上昇する。この変動を前記図４に当てはめると、分圧直流電圧Vaが光センサ８の電圧出力となる。従って、光センサ８の電圧出力が上昇すればTRａに加わるパルス電圧のパルス幅が狭くなり、これにより照度は低下し、光センサ８の電圧出力が減少すればTRａに加わるパルス電圧のパルス幅が広くなり、これにより照度は増加する。これにより、周囲光が変動してもＬＥＤの照度が安定化される。

【００３０】次に、一部ＬＥＤの故障に対する照度制御につき図８をもとに説明する。図８は前記図１の構成を基本とし、ＬＥＤ故障の検出機能を設けたものであり、具体的には第１の抵抗R1及び第２の抵抗R2とを図示のように設け、同抵抗R1との接続点であるＬＥＤ１のアノード及び同抵抗R2との接続点であるＬＥＤ４のアノードそれぞれの電圧変動を故障検出データとして駆動制御信号発生手段10へ入力させたものである。なお、図１と同一のものには同一符号を付してある。上記駆動制御信号発生手段10は主にマイコンで形成され、Ａ／Ｄ変換部10ａ、判定部10ｂ、前記第１のパルス信号Saを発生する第１のパルス信号発生部10ｃ、前記第２のパルス信号Sbを発生する第２のパルス信号発生部10ｄ及びこれら各機能ブロックを制御する制御部10ｅとを備える。

【００３１】この駆動制御信号発生手段10においては、Ａ／Ｄ変換部10ａで入力された前記故障検出データそれぞれをディジタルデータに変換し、判定部10ｂにおいてこれらディジタルデータそれぞれと予め設定してある基準値とを比較する。何れかのＬＥＤが故障してオープン状態になった場合、電流が流れなくなるのでＬＥＤ１又はＬＥＤ４それぞれのアノードの電圧は上昇し、前記基準値を超える。この基準値を超えたことを判定部10ｂにおいて判定される。同判定に従い、制御部10ｅの制御のもとに第１のパルス信号発生部10ｃが発生する第１のパルス信号Saのパルス幅を所定の幅へ拡大する。これにより、正常な側のＬＥＤ群の照度が上昇し、故障による照度低下を補う。なお、その他の動作については図１と同様のため説明を省略する。

【００３２】次に、前述のスイッチングノイズの低減又は一部ＬＥＤの故障に対する照度制御についての別法につき図９をもとに説明する。図９は前記図８の構成に図３の構成を取り込んだものであり、具体的には駆動制御信号発生手段11及び駆動部の構成を異にする。なお、図８又は図３と同一のものには同一符号を付してある。駆動制御信号発生手段11は図示のように、図８の構成における第１のパルス信号発生部10ｃに代え、鋸波状の第１の信号Sdを発生する鋸波発生部11ｃを設けたものである。また、パルス信号発生部11ｄは前記第２のパルス信号Sbと同じパルス信号である第２の信号Seを発生する。この他のＡ／Ｄ変換部11ａ、判定部11ｂ及び制御部11ｅについては図８のものと同様である。また、駆動部は、ＡＮＤゲート１、ＡＮＤゲート２、インバータ３及び演算増幅器５とを図示のように接続して構成する。また、演算増幅器５の逆相入力端（－端）は前記図３と同様にツェナーダイオードDaと抵抗R5とで所定電圧Vaに安定化する。

【００３３】また、鋸波発生部11ｃの鋸波状の第１の信号Sdは演算増幅器５の正相入力端（＋端）に入力し、パルス信号である第２の信号SeはＡＮＤゲート２及びインバータ３に入力する。演算増幅器５は、前述の図３の動作により前記第１のパルス信号Saと同じパルス信号を出力する。従って、この演算増幅器５の出力以降については図８（即ち図１）と同様の動作となり、これにより、ＬＥＤ・Ａ群（ＬＥＤ１～ＬＥＤ３）又はＬＥＤ・Ｂ群（ＬＥＤ４～ＬＥＤ６）は交互にオン（点灯）又はオフ（消灯）し、図１と同様にTR１及びTR２のスイッチングノイズの発生を分散し、同ノイズによる影響を低減する。また、第１の抵抗R1との接続点であるＬＥＤ１のアノード及び第２の抵抗R2との接続点であるＬＥＤ４のアノードそれぞれの電圧変動を故障検出データとして駆動制御信号発生手段11のＡ／Ｄ変換部11ａへ入力させている。これにより、前記図８と同様の動作となり、一部ＬＥＤが故障した場合には正常な側のＬＥＤ群の照度が上昇し、故障による照度低下を補う。なお、その他の動作については図１、図３又は図８と同様のため説明を省略する。

【００３４】

【発明の効果】以上説明したように本発明によれば、複数のＬＥＤを一斉にオンオフすることなく、ＬＥＤブロックごとに交互にオンオフするのでスイッチングトランジスタによるスイッチングノイズの発生が集中すること

がなくなる。また、直流電源が電圧変動した場合にもＬＥＤ発光の明るさを自動的に補正し、安定化する。また、周囲の明るさが変化してもそれに追従した明るさにＬＥＤ発光を制御する。また、一部のＬＥＤが故障して点灯しなくなった場合にもそれを検出し、正常な側のＬＥＤの明るさを上げ、全体の明るさの低下を補償する。このように、本発明は発光素子駆動制御装置の性能向上に寄与し得るものといえる。

【図面の簡単な説明】

【図１】本発明による発光素子駆動制御装置の第１の実施例を示す要部ブロック図である。

【図２】図１を説明するためのタイムチャートである。

【図３】本発明による発光素子駆動制御装置の第２の実施例を示す要部ブロック図である。

【図４】図３を説明するためのタイムチャートである。

【図５】本発明による発光素子駆動制御装置の第３の実施例を示す要部ブロック図である。

【図６】本発明による発光素子駆動制御装置の第４の実施例を示す要部ブロック図である。

【図７】本発明による発光素子駆動制御装置の第５の実施例を示す要部ブロック図である。

【図８】本発明による発光素子駆動制御装置の第６の実施例を示す要部ブロック図である。

【図９】本発明による発光素子駆動制御装置の第７の実施例を示す要部ブロック図である。

【図１０】従来の発光素子駆動制御装置の一例を示す要部ブロック図である。

【符号の説明】

１、２　ＡＮＤゲート

３　インバータ

４、６、７、９、10、11、21　駆動制御信号発生手段

4a、4b、10ｃ、10ｄ，11ｄ　パルス信号発生部

6a、7c、9c、11ｃ　鋸波発生部

7a、9a、10ａ、11ａ　Ａ／Ｄ変換部

7b、9b　比較部

10ｂ、11ｂ　判定部

4c、6b、7d、9d、10ｅ、11ｅ　制御部

５　演算増幅器

８　光センサ

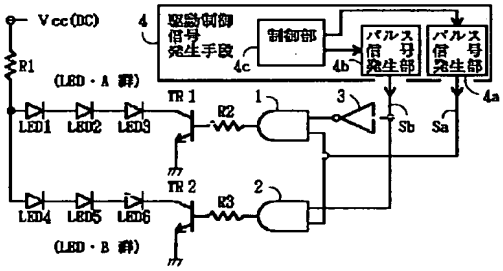
TR１、TR２、TRａ、TR21、TR22　トランジスタ

R1～R4、Ra～Re、R21 ～R23　抵抗

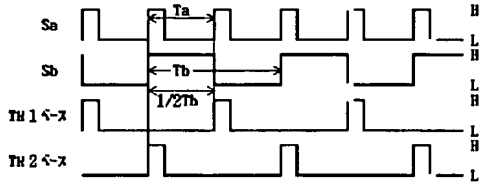
LED1～LED6、LEDa～LEDc、LED21 ～LED26　発光ダイオード

Da　ツェナーダイオード

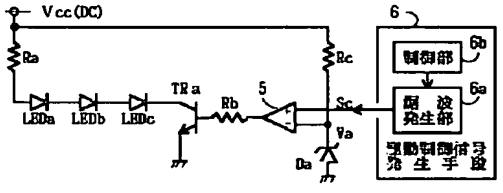
【図１】



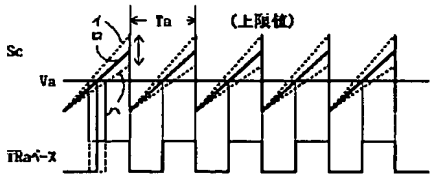
【図２】



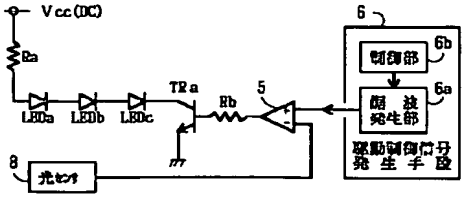
【図３】



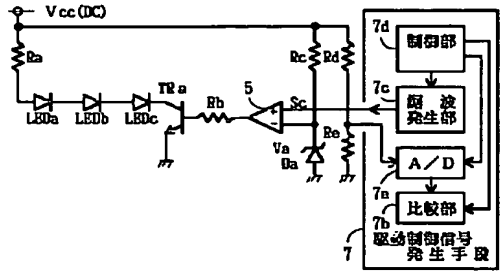
【図４】



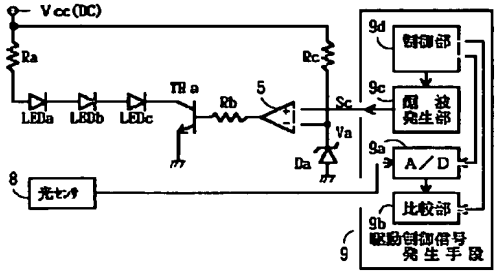
【図７】



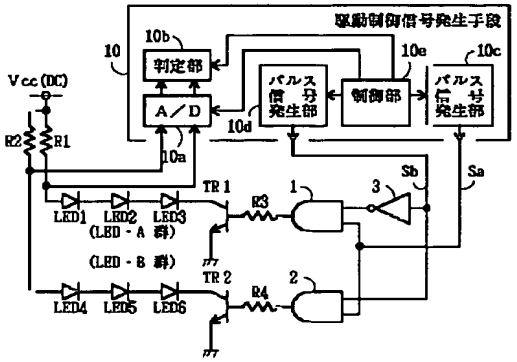
【図5】



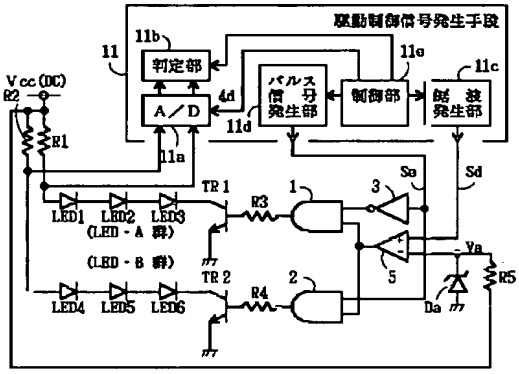
【図6】



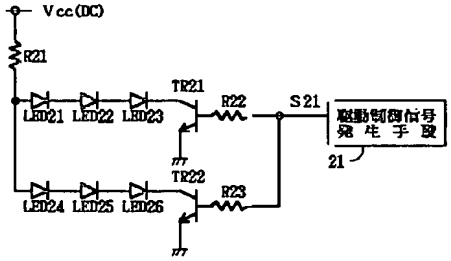
【図8】



【図9】



【図10】



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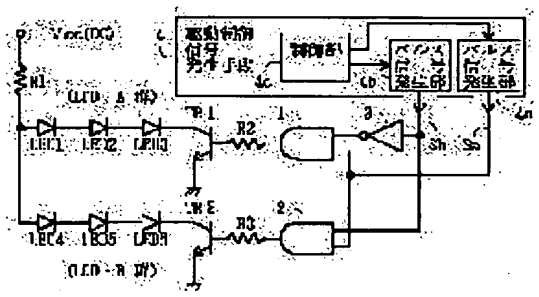
(72)Inventor : KANEHARA HIROYUKI

(54) LIGHT-EMITTING ELEMENT DRIVE CONTROL SYSTEM

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce switching noise and the like related to a light-emitting element drive control system which pulse-drives a plurality of LEDs such as back-light.
SOLUTION: A first pulse signal Sa generated by a first pulse signal generator 4a and a second pulse signal Sb generated by a second pulse signal generator 4b and inputted into a driver comprising a first AND gate 1, a second AND gate 2, and an inverter 3. The cycle of second pulse signal Sb is twice the first pulse signal Sa. Thus, the first AND gate 1 and the second AND gate 2 output pulse signals with a phase deviated, alternately turns on/off switching transistors TR1 and TR2 to disperse occurrence of the switching noise.



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[Date of final disposal for application]

[Patent number]

[Date of registration]

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The 1st LED circuit where DC power supply are impressed to the collector of the 1st transistor for switching through resistance from the other end of two or more LED in which connected with the serial and two or more LED (light emitting diode) carried out the said series connection, The 2nd LED circuit where two or more LED is connected to a serial, and DC power supply are impressed to the collector of the 2nd transistor for switching through said resistance from the other end of two or more LED which carried out the said series connection, The 1st pulse signal of the pulse width which is the signal with which the on-off control of said 1st transistor or the 2nd transistor is presented, and was set up beforehand, A drive control signal generating means to generate the 2nd pulse signal of the pulse width which this pulse signal twice the period of the 1st set up beforehand as a drive control signal, Based on the drive control signal from said drive control signal generating means, the driving signal which turns on or turns off said the 1st transistor and 2nd transistor by turns is constituted from a mechanical component outputted to the base of this 1st transistor, or the base of the 2nd transistor. The light emitting device drive control unit characterized by turning on or switching off LED of said 1st LED circuit, and LED of the 2nd LED circuit by turns.
[Claim 2] The light emitting device drive control unit according to claim 1 characterized by constituting from a control section which controls the 1st pulse signal generating section which generates said 1st pulse signal for said drive control signal generating means, the 2nd pulse signal generating section which generates said 2nd pulse signal, and said 1st pulse signal generating section and the 2nd pulse signal generating section.
[Claim 3] While impressing DC power supply to said 1st LED circuit through the 1st resistance and impressing DC power supply to said 2nd LED circuit through the 2nd resistance While preparing the A/D-conversion section and the judgment section in the bottom of the control section of said drive control signal generating means It inputs into said drive control signal generating means by making the electrical potential difference of the node of said 1st resistance and the 1st LED circuit, and each node of said 2nd resistance and the 2nd LED circuit into the electrical potential difference for fault detection. In this drive control signal generating means, said each of electrical potential difference for fault detection is changed into digital data in said A/D-conversion section. When it distinguishes that carried out comparison distinction of each said-changed data with the reference value in said judgment section, and said electrical potential difference for fault detection of one of LED circuits exceeded the reference value The light emitting device drive control unit according to claim 1 or 2 characterized by extending the pulse width of said 1st pulse signal, and lengthening the lighting period of the LED circuit of another side.
[Claim 4] The inverter which reverses said 2nd pulse signal for said mechanical component, and the 1st AND gate which sends out the signal which took the AND of the signal from this inverter, and said 1st pulse signal to the base of said 1st transistor, The light emitting device drive control unit according to claim 1 or 3 characterized by constituting the signal which took the AND of said 1st pulse signal and 2nd pulse signal from the 2nd AND gate sent out to the base of said 2nd transistor.
[Claim 5] The light emitting device drive control unit according to claim 1 or 3 characterized by setting the pulse width of said 2nd pulse signal as 1/2 of one period.
[Claim 6] The LED circuit where DC power supply are impressed to the collector of the transistor for switching through resistance from the other end of two or more LED in which connected with the serial and two or more LED carried out the said series connection, A drive control signal generating means to generate the drive control signal of the shape of a saw tooth wave which carried out adjustable [of the upper limit], Based on the drive control signal from said drive control signal generating means, the driving signal which turns on or turns off said transistor is constituted from a mechanical component outputted to the base of this transistor. The light emitting device drive control unit characterized by controlling the brightness of luminescence of two or more of said LED by carrying out adjustable [of the upper limit of the drive control signal of the shape of said saw tooth

wave].

[Claim 7] The light emitting device drive control unit according to claim 6 characterized by constituting from the saw-tooth-wave generating section which generates the drive control signal of the shape of said saw tooth wave for said drive control signal generating means, and a control section which controls said saw-tooth-wave generating section.

[Claim 8] While preparing the A/D-conversion section and a comparator in the bottom of the control section of said drive control signal generating means Prepare the resistance dividing network which carries out resistance division of the DC power supply for said two or more LED, input the partial pressure electrical potential difference by this resistance dividing network into said drive control signal generating means, and it sets for this drive control signal generating means. Said comparator compares with a reference value the data which changed said partial pressure electrical potential difference into the digital data, and were said-changed in said A/D-conversion section. The light emitting device drive control unit according to claim 6 or 7 characterized by controlling to carry out adjustable [of the upper limit of the drive control signal of the shape of said saw tooth wave] according to the fluctuation in this comparison, and to make regularity brightness of luminescence of two or more of said LED.

[Claim 9] While preparing the A/D-conversion section and a comparator in the bottom of the control section of said drive control signal generating means Form the photosensor which detects the brightness of an ambient light, input the detecting signal from this photosensor into said drive control signal generating means, and it sets for this drive control signal generating means. Said comparator compares with a reference value the data which changed said detecting signal into the digital data, and were said-changed in said A/D-conversion section. The light emitting device drive control unit according to claim 6 or 7 which carries out adjustable [of the upper limit of the drive control signal of the shape of said saw tooth wave] according to the fluctuation in this comparison, and is characterized by controlling the brightness of luminescence of two or more of said LED according to the brightness of said ambient light.

[Claim 10] The drive control signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge. The direct current voltage of a setup is impressed beforehand. in the opposition input edge, it stabilized based on the DC power supply for said two or more LED -- Claim 6 characterized by constituting the pulse signal which made pulse width the period when said drive control signal exceeded said direct current voltage from an operational amplifier sent out to the base of said transistor, a light emitting device drive control unit according to claim 8 or 9.

[Claim 11] The light emitting device drive control unit according to claim 10 characterized by making direct current voltage impressed to said opposition input edge into the both-ends electrical potential difference of the zener diode connected to the DC power supply for said two or more LED through resistance.

[Claim 12] The light emitting device drive control unit according to claim 6 characterized by to constitute from an operational amplifier which the drive control signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge, and sends out the pulse signal which made pulse width the period which carried out resistance division of the DC power supply for two or more of said LED, and when the direct current voltage of a setup was impressed beforehand at, and said drive control signal exceeded said direct current voltage to an opposition input edge to the base of said transistor.

[Claim 13] The drive control signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge. In an opposition input edge The detecting signal from the photosensor which detects the brightness of an ambient light inputs, and the pulse signal which made pulse width the period when said drive control signal exceeded the direct current voltage concerning said detecting signal is constituted from an operational amplifier sent out to the base of said transistor. The light emitting device drive control unit according to claim 6 characterized by controlling the brightness of luminescence of two or more of said LED according to said detecting signal.

[Claim 14] The 1st LED circuit where DC power supply are impressed to the collector of the 1st transistor for switching through resistance from the other end of two or more LED in which connected with the serial and two or more LED carried out the said series connection, The 2nd LED circuit where two or more LED is connected to a serial, and DC power supply are impressed to the collector of the 2nd transistor for switching through said resistance from the other end of two or more LED which carried out the said series connection, It is the signal with which the on-off control of said 1st transistor or the 2nd transistor is presented. The saw-tooth-wave-like 1st signal, A drive control signal generating means to generate the 2nd signal which is a pulse signal which consists of pulse width which the same period as a said saw-tooth-wave-like signal set up beforehand as a drive control signal, Based on the drive control signal from said drive control signal generating means, the driving signal which turns on or turns off said the 1st transistor and 2nd transistor by turns is constituted from a

mechanical component outputted to the base of this 1st transistor, or the base of the 2nd transistor. The light emitting device drive control unit characterized by turning on or switching off LED of said 1st LED circuit, and LED of the 2nd LED circuit by turns.

[Claim 15] The light emitting device drive control unit according to claim 14 characterized by constituting from a control section which controls the saw-tooth-wave generating section which generates said 1st signal for said drive control signal generating means, the pulse signal generating section which generates said 2nd signal, and said saw-tooth-wave generating section and the pulse signal generating section.

[Claim 16] While impressing DC power supply to said 1st LED circuit through the 1st resistance and impressing DC power supply to said 2nd LED circuit through the 2nd resistance While preparing the A/D-conversion section and the judgment section in the bottom of the control section of said drive control signal generating means It inputs into said drive control signal generating means by making the electrical potential difference of the node of said 1st resistance and the 1st LED circuit, and each node of said 2nd resistance and the 2nd LED circuit into the electrical potential difference for fault detection. In this drive control signal generating means, said each of electrical potential difference for fault detection is changed into digital data in said A/D-conversion section. When it distinguishes that carried out comparison distinction of each said-changed data with the reference value in said judgment section, and said electrical potential difference for fault detection of one of LED circuits exceeded the reference value The light emitting device drive control unit according to claim 14 or 15 characterized by making high the upper limit of the 1st signal of the shape of said saw tooth wave, and lengthening the lighting period of the LED circuit of another side.

[Claim 17] The 1st signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge. The operational amplifier which outputs the pulse signal which made pulse width the period which was stabilized based on the DC power supply for said two or more LED, and when the direct current voltage of a setup was impressed beforehand at, and said drive control signal exceeded said direct current voltage to an opposition input edge, The 1st AND gate which sends out the signal which took the AND of the inverter which reverses said 2nd signal, and the signal from this inverter and the signal from said operational amplifier to the base of said 1st transistor, The light emitting device drive control unit according to claim 14 or 16 characterized by constituting the signal which took the AND of the signal from said operational amplifier, and the 2nd signal from the 2nd AND gate sent out to the base of said 2nd transistor.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a light emitting device drive control device, and relates to drive control of LED (light emitting diode) used for the back light of a liquid crystal display component (LCD) etc. by the detail more.
[0002]
[Description of the Prior Art] Drawing 10 is an example of the conventional light emitting device drive control unit which consists of two or more LED. by this example like illustration with one LED circuit which consists of the transistors TR21 for LED (LED21 -- said -- 22 -- said -- 23) and switching and resistance R22 which were made into three pieces Other LED circuits which consist of same transistor TR22 three LED (LED24 -- said -- 25 -- said -- 26) and for switching and resistance R23 are connected to juxtaposition. Current supply is received from DC power supply Vcc of a predetermined electrical potential difference (DC) through resistance R21 from the LED circuit end side of these parallel connection. moreover, the drive control signal S11 of the shape of a pulse from the drive control signal generating means 21 which mainly consists of microcomputers at the other end side of the LED circuit of parallel connection -- inputting -- resistance R22 or resistance R23 -- minding -- a transistor TR21 or a transistor TR22 -- each base -- adding -- these [TR21] or TR22 is turned on and off.
[0003]
[Problem(s) to be Solved by the Invention] However, in said conventional light emitting device drive control unit, in order to make two or more LED (LED21-LED26) turn on and off all at once, there was a fault that generating of the switching noise of transistors TR21 and TR22 concentrated. When DC power supply Vcc carry out voltage variation, under the conventional configuration, the effect Moreover, a direct receptacle, It stops also turning on LED connected to it and a serial when the fault of changing the brightness of LED luminescence, or a part of LED stop breaking down and lighting up. The fault that the whole brightness falls, the fault that the brightness of LED luminescence is fixed even if surrounding brightness changes further, and it cannot be made the brightness according to surrounding brightness, ********. This invention aims at offering the light emitting device drive control unit which aimed at the improvement of the above-mentioned fault.
[0004]
[Means for Solving the Problem] The 1st LED circuit where DC power supply are impressed through resistance from the other end of two or more LED in which connected at the serial and LED (light emitting diode) of plurality [this invention / collector / of the 1st transistor for switching] carried out the said series connection, The 2nd LED circuit where two or more LED is connected to a serial, and DC power supply are impressed to the collector of the 2nd transistor for switching through said resistance from the other end of two or more LED which carried out the said series connection, The 1st pulse signal of the pulse width which is the signal with which the on-off control of said 1st transistor or the 2nd transistor is presented, and was set up beforehand, A drive control signal generating means to generate the 2nd pulse signal of the pulse width which this pulse signal twice the period of the 1st set up beforehand as a drive control signal, Based on the drive control signal from said drive control signal generating means, the driving signal which turns on or turns off said the 1st transistor and 2nd transistor by turns is constituted from a mechanical component outputted to the base of this 1st transistor, or the base of the 2nd transistor. The light emitting device drive control unit which turns on or switches off LED of said 1st LED circuit and LED of the 2nd LED circuit by turns is offered.
[0005] Moreover, it constitutes from a control section which controls the 1st pulse signal generating section which generates said 1st pulse signal for said drive control signal generating means, the 2nd pulse signal generating section which generates said 2nd pulse signal, and said 1st pulse signal generating section and the 2nd pulse signal generating section.

[0006] Moreover, while impressing DC power supply to said 1st LED circuit through the 1st resistance and impressing DC power supply to said 2nd LED circuit through the 2nd resistance While preparing the A/D-conversion section and the judgment section in the bottom of the control section of said drive control signal generating means It inputs into said drive control signal generating means by making the electrical potential difference of the node of said 1st resistance and the 1st LED circuit, and each node of said 2nd resistance and the 2nd LED circuit into the electrical potential difference for fault detection. In this drive control signal generating means, said each of electrical potential difference for fault detection is changed into digital data in said A/D-conversion section. Comparison distinction of each said-changed data is carried out with a reference value in said judgment section, when it distinguishes that said electrical potential difference for fault detection of one of LED circuits exceeded the reference value, the pulse width of said 1st pulse signal is extended, and the lighting period of the LED circuit of another side is lengthened.
[0007] Moreover, it constitutes from an inverter which reverses said 2nd pulse signal for said mechanical component, the 1st AND gate which sends out the signal which took the AND of the signal from this inverter, and said 1st pulse signal to the base of said 1st transistor, and the 2nd AND gate which sends out the signal which took the AND of said 1st pulse signal and 2nd pulse signal to the base of said 2nd transistor.
[0008] Moreover, the pulse width of said 2nd pulse signal is set as 1/2 of one period.
[0009] Moreover, the LED circuit where DC power supply are impressed through resistance from the other end of two or more LED in which connected at the serial and LED of plurality [this invention / collector / of the transistor for switching] carried out the said series connection, A drive control signal generating means to generate the drive control signal of the shape of a saw tooth wave which carried out adjustable [of the upper limit], Based on the drive control signal from said drive control signal generating means, the driving signal which turns on or turns off said transistor is constituted from a mechanical component outputted to the base of this transistor. The light emitting device drive control unit which controls the brightness of luminescence of two or more of said LED is offered by carrying out adjustable [of the upper limit of the drive control signal of the shape of said saw tooth wave].
[0010] Moreover, it constitutes from the saw-tooth-wave generating section which generates the drive control signal of the shape of said saw tooth wave for said drive control signal generating means, and a control section which controls said saw-tooth-wave generating section.
[0011] Moreover, while preparing the A/D-conversion section and a comparator in the bottom of the control section of said drive control signal generating means Prepare the resistance dividing network which carries out resistance division of the DC power supply for said two or more LED, input the partial pressure electrical potential difference by this resistance dividing network into said drive control signal generating means, and it sets for this drive control signal generating means. It controls to carry out adjustable [of the upper limit of the drive control signal of the shape of said saw tooth wave] according to fluctuation [in / for the data which changed said partial pressure electrical potential difference into the digital data, and were said-changed / this comparison] as compared with a reference value by said comparator in said A/D-conversion section, and to make regularity brightness of luminescence of two or more of said LED.
[0012] Moreover, while preparing the A/D-conversion section and a comparator in the bottom of the control section of said drive control signal generating means Form the photosensor which detects the brightness of an ambient light, input the detecting signal from this photosensor into said drive control signal generating means, and it sets for this drive control signal generating means. As compared with a reference value, adjustable [of the upper limit of the drive control signal of the shape of said saw tooth wave] is carried out according to fluctuation [in / for the data which changed said detecting signal into the digital data, and were said-changed / this comparison] by said comparator in said A/D-conversion section, and the brightness of luminescence of two or more of said LED is controlled according to the brightness of said ambient light.
[0013] Moreover, the drive control signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge, the direct current voltage of a setup is impressed beforehand and the pulse signal which made pulse width the period which was stabilized in the opposition input edge based on the DC power supply for said two or more LED, and when said drive control signal exceeded said direct current voltage consists of operational amplifiers sent out to the base of said transistor.
[0014] Moreover, let direct current voltage impressed to said opposition input edge be the both-ends electrical potential difference of the zener diode connected to the DC power supply for said two or more LED through resistance.
[0015] Or the drive control signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge, in an opposition input edge, the direct current voltage of a setup is impressed beforehand and the pulse signal which made pulse width the period which

carried out resistance division of the DC power supply for said two or more LED, and when said drive control signal exceeded said direct current voltage consists of operational amplifiers sent out to the base of said transistor.

[0016] Moreover, the drive control signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge, the detecting signal from the photosensor which detects the brightness of an ambient light inputs into an opposition input edge, it constitutes from an operational amplifier which sends out the pulse signal which made pulse width the period when said drive control signal exceeded the direct current voltage concerning said detecting signal to the base of said transistor, and the brightness of luminescence of two or more of said LED controls according to said detecting signal.

[0017] Moreover, the 1st LED circuit where DC power supply are impressed through resistance from the other end of two or more LED in which connected at the serial and LED of plurality [this invention / collector / of the 1st transistor for switching] carried out the said series connection, The 2nd LED circuit where two or more LED is connected to a serial, and DC power supply are impressed to the collector of the 2nd transistor for switching through said resistance from the other end of two or more LED which carried out the said series connection, It is the signal with which the on-off control of said 1st transistor or the 2nd transistor is presented. The saw-tooth-wave-like 1st signal, A drive control signal generating means to generate the 2nd signal which is a pulse signal which consists of pulse width which the same period as a said saw-tooth-wave-like signal set up beforehand as a drive control signal, Based on the drive control signal from said drive control signal generating means, the driving signal which turns on or turns off said the 1st transistor and 2nd transistor by turns is constituted from a mechanical component outputted to the base of this 1st transistor, or the base of the 2nd transistor. The light emitting device drive control unit which turns on or switches off LED of said 1st LED circuit and LED of the 2nd LED circuit by turns is offered.

[0018] Moreover, it constitutes from a control section which controls the saw-tooth-wave generating section which generates said 1st signal for said drive control signal generating means, the pulse signal generating section which generates said 2nd signal, and said saw-tooth-wave generating section and the pulse signal generating section.

[0019] Moreover, while impressing DC power supply to said 1st LED circuit through the 1st resistance and impressing DC power supply to said 2nd LED circuit through the 2nd resistance While preparing the A/D-conversion section and the judgment section in the bottom of the control section of said drive control signal generating means It inputs into said drive control signal generating means by making the electrical potential difference of the node of said 1st resistance and the 1st LED circuit, and each node of said 2nd resistance and the 2nd LED circuit into the electrical potential difference for fault detection. In this drive control signal generating means, said each of electrical potential difference for fault detection is changed into digital data in said A/D-conversion section. Comparison distinction of each said-changed data is carried out with a reference value in said judgment section, when it distinguishes that said electrical potential difference for fault detection of one of LED circuits exceeded the reference value, the upper limit of the 1st signal of the shape of said saw tooth wave is made high, and the lighting period of the LED circuit of another side is lengthened.

[0020] Moreover, the 1st signal of the shape of a saw tooth wave from said drive control signal generating means inputs said mechanical component into a non-inverter input edge. The operational amplifier which outputs the pulse signal which made pulse width the period which was stabilized based on the DC power supply for said two or more LED, and when the direct current voltage of a setup was impressed beforehand at, and said drive control signal exceeded said direct current voltage to an opposition input edge, The 1st AND gate which sends out the signal which took the AND of the inverter which reverses said 2nd signal, and the signal from this inverter and the signal from said operational amplifier to the base of said 1st transistor, The signal which took the AND of the signal from said operational amplifier and the 2nd signal consists of the 2nd AND gate sent out to the base of said 2nd transistor.

[0021]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of invention is explained with reference to a drawing based on an example. Drawing 1 is the 1st example of the light emitting device drive control device by this invention, and the important section block diagram of the configuration aiming at reduction of a switching noise and drawing 2 are the timing diagrams for explaining drawing 1 . Moreover, drawing 3 is the 2nd example of the light emitting device drive control unit by this invention, and the important section block diagram and drawing 4 which show the basic configuration of control of the brightness (it is hereafter described as an illuminance) of LED luminescence are a timing diagram for explaining drawing 3 . Moreover, drawing 5 is the 3rd example of the light emitting device drive control unit by this invention, and is the important section block diagram showing the basic configuration of the illumination control to the voltage variation of DC power supply Vcc.

[0022] Moreover, drawing 6 is the 4th example of the light emitting device drive control device by this invention, and is the important section block diagram showing the basic configuration of the illumination control to fluctuation of an ambient light. Moreover, drawing 7 is the 5th example of the light emitting device drive control unit by this invention, is the exception method of drawing 6 , and is the important section block diagram showing the basic configuration of the illumination control to fluctuation of an ambient light. Moreover, drawing 8 is the 6th example of the light emitting device drive control unit by this invention, and is the important section block diagram of a configuration of coping with failure of LED a part on the basis of the configuration of said drawing 1 . Moreover, it is the 7th example of the light emitting device drive control unit by this invention, and drawing 9 incorporates the configuration of drawing 3 in the configuration of said drawing 8 , and is reduction of a switching noise, or the important section block diagram of a configuration of coping with failure of LED in part.

[0023] Hereafter, each actuation of this invention is explained. First, it is explained as the basic configuration for switching noise reduction per actuation. In drawing 1 , it is the same as usual (drawing 10 R> 0) about DC power supply Vcc, resistance R1-R3, light emitting diodes LED1-LED6, and the transistors TR1 and TR2 for switching. the mechanical component which consists of the 1st AND gate 1 (following, AND gate 1), 2nd AND gate 2 (following, AND gate 2), and inverter 3 like illustration to this circuit -- preparing -- the AND gate 1 and the AND gate 2 -- the 1st pulse signal Sa and 2nd pulse signal Sb which are a drive control signal which the drive control signal generating means 4 generates are impressed to each input end. This drive control signal generating means 4 is mainly formed with a microcomputer (the following, microcomputer), and is equipped with control-section 4c which controls 1st pulse signal generating section 4a which generates said 1st pulse signal Sa like illustration, 2nd pulse signal generating section 4b which generates said 2nd pulse signal Sb, and these generating section.

[0024] The wave of the 1st pulse signal Sa of the above and the 2nd pulse signal Sb is shown in drawing 2 . Like illustration, the period Tb of the 2nd pulse signal Sb was made into twice the period Ta of the 1st pulse signal Sa, and is set as 1/2 of the 1 period Tb about the pulse width of the 2nd pulse signal Sb. The control signal which reversed the 1st pulse signal Sa and 2nd pulse signal Sb with the inverter 3 is impressed to the AND gate 1 by this, and the 1st pulse signal Sa and 2nd pulse signal Sb are impressed to the AND gate 2. Consequently, the wave-like pulse signal shown in the base of transistors TR1 and TR2 at drawing 2 is impressed, and it turns on in a pulse forward period, respectively. illustration -- as for the pulse signal which joins the base of TR1 or TR2, on-timing is shifted like. Thereby, it turns on or (lighting) turns off by turns (putting out lights), since all LED is not turned on and off to coincidence like before, generating of the switching noise of TR1 and TR2 is distributed, and a LED-A group (LED1-LED3) or a LED-B group (LED4-LED6) can reduce the effect by this noise.

[0025] Next, it explains per control of the brightness (illuminance) of LED luminescence. The basic configuration of illumination control is shown in drawing 3 . Drawing 3 R> 3 is the example of an LED circuit which made LED three pieces, Resistance Ra, LEDa, and LEDb and LEDc are prepared in the collector of the transistor TRa for switching at a serial, and DC power supply Vcc are impressed to Resistance Ra. Moreover, it prepares like illustration of the operational amplifier 5 as a mechanical component which drives said TRa, the drive control signal Sc from the drive control signal generating means 6 inputs into the non-inverter input edge (+ edge), and the predetermined electrical potential difference Va which pressured DC power supply Vcc partially with Resistance Rc and zener diode Da is impressed to an opposition input edge (- edge). The output signal is impressed through Resistance Rb to the base of TRa. In addition, when stabilization of said electrical potential difference Va of an opposition input edge is unnecessary, it replaces with said zener diode Da, and is good also as resistance (do not resistance-divide, - not shown). Moreover, the drive control signal generating means 6 is mainly formed with a microcomputer, and is equipped with saw-tooth-wave generating section 6a which generates the saw-tooth-wave-like drive control signal Sc like illustration, and control-section 6b which controls said saw-tooth-wave generating section 6a.

[0026] Each wave of the base electrical potential difference of the above-mentioned drive control signal Sc and the partial pressure direct current voltage Va and TRa of an opposition input edge (- edge) is shown in drawing 4 . As shown in this drawing, the drive control signal Sc which saw-tooth-wave generating section 6a outputs is the saw tooth wave which fixed the period Ta, and a lower limit is a signal in which a upper limit carries out adjustable like I of illustration, RO, and Ha as immobilization. Moreover, relation between the above-mentioned drive control signal Sc and the partial pressure direct current voltage Va is carried out like illustration. Consequently, the pulse output (saturation power) of the operational amplifier 5 is carried out about the period when the drive control signal Sc exceeded the partial pressure direct current voltage Va. Therefore, if said upper limit changes like I, RO, and Ha, the pulse width of this pulse output will become a different thing. A this pulse width adjustable signal is impressed as a base electrical potential difference of TRa, and LEDa-LEDc turns on in the period of this pulse width. In this case, if the "on" period of TRa will become long, an illuminance will go up, if

pulse width is made large, and pulse width is narrowed conversely, the "on" period of TRa will become short and an illuminance will fall. Thus, an illuminance is controlled by carrying out adjustable [of the upper limit of the drive control signal Sc].

[0027] Next, it explains based on drawing 5 per [to fluctuation of DC power supply Vcc using the configuration (drawing 3) of said illumination control] illumination control. Drawing 5 forms the resistance Rd and Re which pressures DC power supply Vcc partially in the thing of the configuration of said drawing 3 , and it is made to input it into the drive control signal generating means 7 by using this partial pressure electrical potential difference as line-voltage-variation data. In addition, the same sign is given to the same thing as drawing 3 . The above-mentioned drive control signal generating means 7 is mainly formed with a microcomputer, and is equipped with 7d of control sections which control A/D-conversion section 7a, comparator 7b, saw-tooth-wave generating section 7c that generates the drive control signal Sc of the shape of a saw tooth wave of said drawing 3 and this function, and each [these] functional block. In this drive control signal generating means 7, said line-voltage-variation data inputted by A/D-conversion section 7a are changed into digital data, the digital data of a comparator 7b smell lever is compared with the reference value set up beforehand, the drive control signal Sc set as the upper limit (drawing 4) according to this comparison is generated in saw-tooth-wave generating section 7c, and it outputs to the non-inverter input edge (+ edge) of an operational amplifier 5. in this case -- the time of DC power supply Vcc falling, therefore a partial pressure electrical potential difference also falling -- said upper limit -- a certified value -- a necessary value -- the time of outputting the drive control signal Sc made high, and DC power supply Vcc going up conversely, therefore a partial pressure electrical potential difference also rising -- said upper limit -- a certified value -- a necessary value -- it is made to output the drive control signal Sc made low The "on" period of the part TRa to which DC power supply Vcc were changed is adjusted by this, and the illuminance of LED is stabilized.

[0028] Next, the configuration (drawing 3) of said illumination control is used, and it explains based on drawing 6 per [which was made to follow an ambient light] illumination control. Drawing 6 forms the photosensor 8 which detects an ambient light in the thing of the configuration of said drawing 3 , and it is made to input it into the drive control signal generating means 9 by using the voltage output of this photosensor 8 as ambient-light data. In addition, the same sign is given to the same thing as drawing 3 . The above-mentioned drive control signal generating means 9 is mainly formed with a microcomputer, and is equipped with 9d of control sections which control A/D-conversion section 9a, comparator 9b, saw-tooth-wave generating section 9c that generates the drive control signal Sc of the shape of a saw tooth wave of said drawing 3 and this function, and each [these] functional block. In this drive control signal generating means 9, said ambient-light data inputted by A/D-conversion section 9a are changed into digital data, the digital data of a comparator 9b smell lever is compared with the reference value set up beforehand, the drive control signal Sc set as the upper limit according to this comparison is generated in saw-tooth-wave generating section 9c, and it outputs to the non-inverter input edge (+ edge) of an operational amplifier 5. in this case -- the time of an ambient light falling (darkly) and the voltage output of a photosensor 8 declining -- said upper limit -- a certified value -- a necessary value -- the time of outputting the drive control signal Sc made high, an ambient light going up conversely (bright), and the voltage output of a photosensor 8 going up -- said upper limit -- a certified value -- a necessary value -- it is made to output the drive control signal Sc made low The "on" period of the part TRa to which the ambient light was changed is adjusted by this, and the illuminance of LED is stabilized.

[0029] Or as an exception method of the configuration of said drawing 6 , it is good also as a configuration of drawing 7 . Drawing 7 inputs the voltage output of a photosensor 8 into the opposition input edge (- edge) of the operational amplifier 5 in the configuration of said drawing 3 . In addition, the same sign is given to the same thing as drawing 3 or drawing 6 . The potential of an opposition input edge (- edge) is changed according to an ambient light, by this configuration, if an ambient light falls (darkly), this potential will also fall, and if an ambient light goes up (bright), this potential will also rise. If this fluctuation is applied to said drawing 4 R> 4, the partial pressure direct current voltage Va will serve as a voltage output of a photosensor 8. Therefore, if the pulse width of the pulse voltage which joins TRa will become narrow if the voltage output of a photosensor 8 goes up, an illuminance falls by this and the voltage output of a photosensor 8 decreases, the pulse width of the pulse voltage which joins TRa will become large, and, thereby, an illuminance will increase. Thereby, the illuminance of LED is stabilized even if it changes an ambient light.

[0030] Next, a part is explained based on drawing 8 per [to failure of LED] illumination control. Drawing 8 prepares the detection function of LED failure on the basis of the configuration of said drawing 1 , specifically prepares it like illustration of the 1st resistance R1 and the resistance R2 of the 2nd, and is made to input into the drive control signal generating means 10 by using as fault detection data voltage variation of each anode of LED4 which is the anode of LED1 which is a node with this resistance R1, and a node with this resistance R2. In addition, the same sign is given to the same thing as drawing 1 . The above-mentioned drive control signal

generating means 10 is mainly formed with a microcomputer, and is equipped with control-section 10e which controls the 2nd 10d of pulse signal generating sections and each [these] functional block which generates A/D-conversion section 10a, judgment section 10b, 1st pulse signal generating section 10c that generates said 1st pulse signal Sa, and said 2nd pulse signal Sb.

[0031] In this drive control signal generating means 10, said each of fault detection data inputted by A/D-conversion section 10a are changed into digital data, and each of these digital data are compared with the reference value set up beforehand in judgment section 10b. since a current will not flow when which LED breaks down and it changes into an opening condition -- LED1 or LED4 -- the electrical potential difference of each anode rises and exceeds said reference value. In judgment section 10b, it judges having exceeded this reference value. According to this judgment, the pulse width of the 1st pulse signal Sa which 1st pulse signal generating section 10c generates on the basis of control of control-section 10e is expanded to predetermined width of face. The illuminance of the LED group of a normal side rises by this, and the illuminance fall by failure is compensated. In addition, since it is the same as that of drawing 1 about other actuation, explanation is omitted.

[0032] Next, it explains reduction of the above-mentioned switching noise, or based on another method per drawing 9 [as opposed to failure of LED in part] about illumination control. Drawing 9 incorporates the configuration of drawing 3 R> 3 in the configuration of said drawing 8 , and specifically differs in the configuration of the drive control signal generating means 11 and a mechanical component. In addition, the same sign is given to the same thing as drawing 8 R> 8 or drawing 3 . Like illustration, the drive control signal generating means 11 replaces with 1st pulse signal generating section 10c in the configuration of drawing 8 , and prepares saw-tooth-wave generating section 11c which generates the saw-tooth-wave-like 1st signal Sd. Moreover, 11d of pulse signal generating sections generates the 2nd signal Se which is the same pulse signal as said 2nd pulse signal Sb. About other A/D-conversion section 11a, judgment section 11b, and control-section 11e, it is the same as that of the thing of drawing 8 . Moreover, it connects like illustration and a mechanical component constitutes the AND gate 1, the AND gate 2, an inverter 3, and an operational amplifier 5. Moreover, the opposition input edge (- edge) of an operational amplifier 5 is stabilized on the predetermined electrical potential difference Va by zener diode Da and resistance R5 like said drawing 3 .

[0033] Moreover, the 1st signal Sd of the shape of a saw tooth wave of saw-tooth-wave generating section 11c is inputted into the non-inverter input edge (+ edge) of an operational amplifier 5, and inputs into the AND gate 2 and an inverter 3 the 2nd signal Se which is a pulse signal. An operational amplifier 5 outputs the same pulse signal as said 1st pulse signal Sa by actuation of above-mentioned drawing 3 . Therefore, it becomes the actuation same about the output of this operational amplifier 5 or subsequent ones as drawing 8 (namely, drawing 1), and by this, a LED-A group (LED1-LED3) or a LED-B group (LED4-LED6) is turned on or (lighting) turned off by turns (putting out lights), generating of the switching noise of TR1 and TR2 is distributed like drawing 1 , and the effect by this noise is reduced. Moreover, it is made to input into A/D-conversion section 11a of the drive control signal generating means 11 by using as fault detection data voltage variation of each anode of LED4 which is the anode of LED1 which is a node with the 1st resistance R1, and a node with the 2nd resistance R2. This becomes the same actuation as said drawing 8 , when LED breaks down in part, the illuminance of the LED group of a normal side rises, and the illuminance fall by failure is compensated. In addition, since it is the same as that of drawing 1 , drawing 3 , or drawing 8 about other actuation, explanation is omitted.

[0034]

[Effect of the Invention] Without turning two or more LED on and off all at once according to this invention, as explained above, since it turns on and off by turns for every LED block, it is lost that generating of the switching noise by the switching transistor concentrates. Moreover, also when DC power supply carry out voltage variation, the brightness of LED luminescence is amended automatically and stabilized. Moreover, even if surrounding brightness changes, LED luminescence is controlled to the brightness which followed it. Moreover, also when a part of LED stops breaking down and lighting up, it is detected, the brightness of LED of a normal side is raised, and the fall of the whole brightness is compensated. Thus, this invention can be called what can contribute to the improvement in the engine performance of a light emitting device drive control unit.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the important section block diagram showing the 1st example of the light emitting device drive control device by this invention.
[Drawing 2] It is a timing diagram for explaining drawing 1 .
[Drawing 3] It is the important section block diagram showing the 2nd example of the light emitting device drive control device by this invention.
[Drawing 4] It is a timing diagram for explaining drawing 3 .
[Drawing 5] It is the important section block diagram showing the 3rd example of the light emitting device drive control device by this invention.
[Drawing 6] It is the important section block diagram showing the 4th example of the light emitting device drive control device by this invention.
[Drawing 7] It is the important section block diagram showing the 5th example of the light emitting device drive control device by this invention.
[Drawing 8] It is the important section block diagram showing the 6th example of the light emitting device drive control device by this invention.
[Drawing 9] It is the important section block diagram showing the 7th example of the light emitting device drive control device by this invention.
[Drawing 10] It is the important section block diagram showing an example of the conventional light emitting device drive control device.
[Description of Notations]
1 Two AND gate
3 Inverter
4, 6, 7, 9, 10, 11, 21 Drive control signal generating means
4a, 4b, 10c, 10d, 11d Pulse signal generating section
6a, 7c, 9c, 11c Saw-tooth-wave generating section
7a, 9a, 10a, 11a A/D-conversion section
7b, 9b Comparator
10b, 11b Judgment section
4c, 6b, 7d, 9d, 10e, 11e Control section
5 Operational Amplifier
8 Photosensor
TR1, TR2, TRa, TR21, TR22 Transistor
R1-R4, Ra-Re, R21 -R23 Resistance
LED1-LED6, LEDa-LEDc, LED21 - LED26 Light emitting diode
Da Zener diode

[Translation done.]